

Quarterly Progress Report

NASr-138

31 October 1966

*V. Arizona*

Ground-based Polarimetry of the Moon

The attached photograph shows the NASr-138 polarimeter on a telescope mount at Tumamoc Hill just west of Tucson. The two 7.5-cm telescopes are used simultaneously and the output of the four photomultipliers is recorded on printed papertape. In the console are the digital voltmeter, the clock, the digital recorder, two power supplies, and the printer.

The observations are presently being made by Dr. G. V. Coyne S.J. and by Mr. S. F. Pellicori. The polarization of the whole Moon is observed with filters at 3300, 3600, 3850, 4200, and 5300 Angstroms at the widest possible range of phases. Preliminary tests have been made on the instrumental polarization and depolarization with the above mentioned filters and the effects are found to be negligible. The polarization of the Moon increases towards shorter wavelengths. The amounts are obtained with a probable error of  $\pm 0.03\%$  ( $\pm 0.0006$  magnitude).

In order to illustrate the care and the number of detailed jobs required for getting a new polarimeter operational, I have attached an Appendix to this report. This is an informal report by Mr. Pellicori and his group on some of their activities, December 1965 - October 1966.

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|-------------------|-------------------------------|-------------|
| FACILITY FORM 602 | N 66-87894                    | (THRU)      |
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Work Done to Extend the Spectral Range of the Mariner-Voyager  
Polarimeter to 6000 Å.

Dec '65 After Flight.

1. Investigate the use of calcite wollastons.
2. Ray trace several thin prisms and get quotes.
3. Design specs. for interference filters which do not transmit in the visible.
4. Have ADP Glan Thompson prism reworked for lab measurements.
5. Trace flight filters after flight.
6. Have field mirrors ground on edges, realuminized, and overcoated.
7. Assemble repolished ADP valves.
8. Design new field mirrors, mirror mounts and new optics boards.
9. Trace ADP prisms for Teska, many variations.

1 Mar '66

1. Decide what is required of new HV PS's.
2. New HV selector board.
3. Finish paper.
4. New ADP wollastons.
5. Check out polarimeter.
6. Redesign field mirror-mounts.
7. Design new field mirrors with different focal lengths.
8. Design new depolarizer arm with spaces for path length equalizers.
9. Design larger liquid filter cells.
10. Refl. of sand-blasted screens.
11. Gain select tests by P. Gray.

15 Apr Electronics work (completed by P. Gray)

1. Rewire for two new HV PS's which work at 24 v. instead of the old ones at + and -12 v.
2. New selector board for HVPS
3. Work on log amps.
4. Design and construct digital decoder to work with HP printer.
5. 2nd magnetometer.
7. Check reference supply. Paul designed a new one.
8. Thermistors.
9. Additional integrator power supply.
10. Get ready for ground operation.
11. environmental tests.

29 July

1. New ADP prisms received and polished.
2. New depol. arm design.
3. New magnesium fluoride depolarizer.
4. Design new optics boards because focal length of telescopes changed in order to allow more room for the separation of the O & E beams of the wollaston at 6000 Å.
5. Aug 3 - 23, design gondola rotator. Draw machine drawings for it. order torque motor.
6. New field mirrors started.
7. Change filter wheel readout, rebuild.
8. Finish potting PM tubes (9526 B).
9. Trace Isomet ADP. Have it polished by Flamondon.

10. Filter specs.
11. Filters for ground work.
12. Polish new lenses for new prisms and new f/ratio of scopes.
13. 23 Aug - 30, Gray rewiring gondola in Palestine.
15. Sept. cold test of system.

17 Sept.

1. Mount new depolarizers.
  2. Mount and align new field mirrors.
  3. Cut filters, new solution.
  4. Make mount for HV PS's.
  5. Match PM tubes if necessary.
  6. New diaphragms for focal plane.
  7. Assemble prisms.
  8. Locate PM tubes.
  9. Adjust gain selector. Test.
  10. Cold test of system
- Operational 19 Sept. Tumamoc 21 Sept. to 7 Oct.

7 Oct.

1. Repolish primaries. The polish near the edges was seen to be poor after aluminization.
2. Align MgF2 depolarizers.
3. Trace new filters.
4. Environ. test

9 Oct. Altitude test 24°C. No problems.

11 Oct. Cold-Altitude test. No problems.



